

AVIATION AND AERONAUTICAL ENGINEERING



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1917

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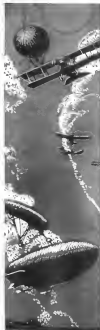
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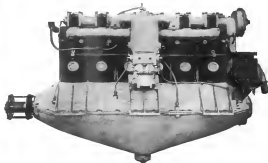
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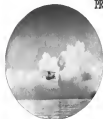


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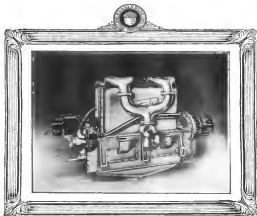
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JUNE 1, 1917

AVIATION AND AERONAUTICAL ENGINEERING

Member of the Associated Business Papers

VOL. II. NO. 9

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AVIATION AND AERONAUTICAL ENGINEERING

THOMAS EDWIN
A. KLEIN, A.C.I., S.M., S.E.
Secretary to the
National Institute of Technology
Professor of
Aeronautics
GEORGE NEWBOLD

Vol. 11

June 1, 1917

No. 9

NOTWITHSTANDING the demands made upon them by the prosecution of the greatest war in history, Great Britain and France have already undertaken the work of preparing what steps can be taken with a view to the development and regulation of aviation for civil and commercial purposes, after the war.

The following extract from a speech in the House of Commons by the Parliamentary Secretary to the Air Board explains what both countries are endeavoring to accomplish:

"It appeared to the Board, and it has been approved by the Prime Minister, that it should be our duty to investigate the necessities of aerial civil transport after the war. It will be apparent to honorable members that when the war comes to an end there will be not only a vast number of highly skilled pilots, but there will be a large number of airplanes in the hands of the Service, and a still larger number of airplanes and small engines in order."

"I have quoted the number of people engaged in the industry today (1916) from, of which the fifty largest employ 60,000 persons). They are more likely to increase than to diminish. Therefore, it does not appear to be unreasonable that the Air Board should take up as a subject of inquiry as far as possible, the issue that can be made of aircraft after the war, and for that purpose it has been decided to constitute a committee, of which Lord Northcliffe has been asked to take the chair and has accepted, and it is proposed that the committee should comprise representatives not only of the two Services and of the Air Board, but also of the Board of Trade, the Post Office, the Customs, the Treasury, and from the Dominions, and also, of course, of the manufacturers and designers, and obviously it would be desirable that Parliament should be represented. The terms of reference are as follows: to consider and report to the Air Board with regard to:

1. The steps which should be taken with a view to the development and extension, after the war, of aviation for civil and commercial purposes, from a domestic and Imperial and an international standpoint.
2. The extent to which it will be possible to utilize for the other purposes, the trained personnel and the aircraft the surplus of capacity may have surplus to the requirements of the Naval and Military Air Services of the United Kingdom and Dominions Dependencies.

"The Committee corresponds to a similar body which has already been created in France under the presidency of M. d'Albignac. It was set up by the Ministry of Commerce, and was appointed to consider the routes to be followed in France, the Colonies and in Allied countries, types of machines to be employed, type of aircraft, carrier, base, relay stations, and the recruitment of personnel, as well as the questions of the purchase of engines, airplanes, engines, etc., for the military authorities."

It is significant that the British Committee is headed

by Lord Northcliffe, owner of the London Times, who has been a consistent and powerful advocate of the Air Service, and whose fearless and constructive opinions are considered by every well informed man to have saved England from serious mistakes, if not after failure in the conduct of the war.

Our Government should at once take steps to provide for a similar investigation to be undertaken in this country. A Federal Commission should be authorized, organized somewhat along the lines of the British Committee, or the task should be undertaken by the National Advisory Committee for Aeronautics.

Unless this is done, and unless some definite steps are taken to solve these important problems relating to the future commercial uses of aircraft, the United States will find itself, at the conclusion of peace, with an enormous industry built up during the war, ready to develop the commercial airplane, but without definite plans and ones for the facilities they have acquired. The time to prepare for the future is today.

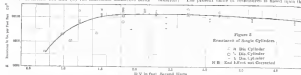
Confusion Should Be Cleared Up

One of the greatest dangers to the present status of aviation in this country is the over-organization by committees. The President appointed the National Advisory Committee for Aeronautics to supervise and direct the scientific study of the problems of flight with a view to their practical solution. A joint board of the Army and Navy has been set up on the engineering problems of design and specifications. Civilian boards and committees have been appointed by organizations to advise the government, and now the Council of National Defense creates an Aircraft Production Board to formulate the government's aircraft policy and carry it into effect. A statement regarding the work of the board appears elsewhere in this issue. The general impression prevails that this board will have to do with purchasing and will have general supervision of production.

In this connection it would be well if a clear statement were made outlining the authority of each board and its special functions. The law creating the Council of National Defense makes it an advisory board which works through the regular departments of the government.

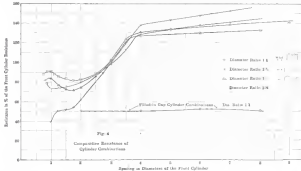
To do aeronautical business with the government at the present time requires a knowledge of the intricacies of not only the Army and the Navy bureaus, but of these various committees whose approvals are still slowly deferred. A definite statement of all such work will be of great assistance at this time.

the value of "K" calculated from the formula $R = KDL^2$ where R = measured resistance of resistance in pounds, D = diameter of front cylinder in feet, L = length of specimen in feet (1.5), V = wind velocity in feet per second (44). In combinations (1) and (5) the maximum diameters being



respectively 1.2 and 1.5 in., the coefficient "K" has been reduced to that of a 1 in. diameter cylinder at 50 m.p.h. by the D/V law. This permits of a comparison of all four combinations, with the value of "K" for the single 1 in. diameter cylinder at 50 m.p.h. Fig. 4 is a plot of these comparisons where the resistance of the single cylinder is taken as unity and the net resistance plotted against cylinder spacing.

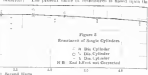
(4) Resistance of cylinder combination with fillet in gap (a) it was thought a reduction in resistance might be obtained by filling in the space in gap between the tandem wires to simulate the process of overlapping fillets or interlocking in wooden "stream line" wire where they come in pairs. Four filled in gap combinations, shown in Fig. 5, were tested, representing coverage of 2, 4, 6, 8 diameter of the 1 in. wires, respectively by means 2 in. thick with semi-circular ends. (b) One specimen was tested to represent the 1-1/2 inch with a spacing of 4 diameters to simulate if any further in-



crease caused from filling in the space in the gap type. The 1 1/2 inch was chosen was it would represent more closely practical practice. The length of all barrels was 18 in., as in the previous tests. All specimens, comparing the tapering type, were tested with

one edge, and then the other facing the wind, and the results averaged in order to reduce to a minimum all errors due to measuring and orientation.

The results of (a) are plotted in Fig. 4 (filled in gap combination). The present value of resistance is based upon the



resistance of the single 1 in. cylinder, as before, as the value was directly comparable.

Test (b) is shown as only one point on Fig. 4, giving a value of 50 per cent and of the resistance for the single cylinder. A slight improvement over the 1-1 combination.

Discussion of Results

An examination of Fig. 4 gives us the general impression of the comparison. Outside the first three ratios, 1, 1 1/2, 2, 2 1/2, the curves of all four the same diameter, spacing and increasing each other across them. The general trend is, in each case, a slight decrease in resistance between the spacing of 1 and 2 diameters to an average of 50 per cent of the resistance of a single wire, then a gradual increase in resistance as the spacing is progressively lengthened to 4, 6 and 8 diameters where the two wires have about 1.86 per cent of the resistance of a single wire. About 4 diameters the rate of

spacing of each that the resistance is progressively lowered in the ratio of approximately unity, as:

$$\frac{R}{R_1} = \frac{1}{1 + \frac{D}{S}}$$

From 1 to 4 diameters the curve is coincident with the other type, and above 4 diameters one a little more steeply, as we indicated, roughly 200 per cent, which should be in estimate. The curve for the filled in gap tends to self explanatory.

Conclusions

The 1-1 ratio, as generally supplied by manufacturers today in the wire wire having given approximately low resistance than the other three combinations, the spacing less than 4 diameters, and only a small per cent more in greater spacing. In general, it would be correct to say that the wire wire is the strongest, necessitating a larger wire than used in the 1-1 ratio—also a larger and resistance—with the probable loss of any slight advantage anticipated from the tapering combination.

In practice, no material advantage is to be gained where tandem wires are employed by making the rear wire of a smaller diameter than the front one.

The general trend and spacing of two wires in tandem gave a resistance of approximately one and a half that of a single wire.

The resistance of one combination is greatly reduced by filling in the gap between the cylinders, especially where the space is greater than four diameters.

When wires are wrapped the spacing is of the importance. Tapering the wires and wire is of the material advantage.

Recommendations

(1) The most gain in resistance, ratio of equal diameters where two wires are coupled should be adhered to, as it is the best, both from resistance and strength considerations.

(2) Unless the space between the wires is less than 2 diameters, the gap between them should be filled. Two-thirds of the resistance in this case.

As no dimension of the advantage is to be gained by filling in the gap the following combination for a tapered type

has been included. It was arranged as usual, double flying wires, single landing wires, diameter 1/2 in., total length, 36 in., length exposed to wind, 138 in., of single wire. 1.25 in. of double wire, spacing 6 diameters, 15 in. Resistance of wire at high speed 55 m.p.h. Resistance of single wire at 55 m.p.h. 225 lb. per foot.

From Fig. 4, resistance of double wire covered, 6 diameters, spacing, equals 345 per cent of single wire. Therefore, resistance double wire = $225 \times 3.45 \times 120 = 94$ lb. Resistance of single wire = 225 lb. Total resistance = 119 lb.

When gap on double wire is filled in resistance is only 53 per cent of single wire. Double wire resistance = $225 \times .53 \times 120 = 14$ lb. Total resistance = 14 lb.

Using double wires of equivalent strength for landing wires in place of single 1/2 in. and filling in the gap, we have an additional saving.

Using two 1/2 in. wires, resistance at 55 m.p.h. = 180 lb. per foot per. Resistance double wire, 6 diameters spacing filled in gap 53 per cent single wire = $180 \times .53 \times 120 = 14$ lb. From above flying wire resistance = 14 lb.

Total resistance, with both flying and landing wires gap filled = $14 + 14 = 28$ lb. Saving over original, $119 - 28 = 91$ lb.

Non-superior used by filling in wire gaps in wing construction = $2 \times 1.25 \times 120 = 300$ lb. $300 \times 1.25 = 375$ lb.

Aeronautical Patents

Patents of these patents may be obtained for the entire year by referring to "Patents of Aeronautical Engineers" at the following:

1936-1937, 1937-1938, 1938-1939, 1939-1940, 1940-1941, 1941-1942, 1942-1943, 1943-1944, 1944-1945, 1945-1946, 1946-1947, 1947-1948, 1948-1949, 1949-1950, 1950-1951, 1951-1952, 1952-1953, 1953-1954, 1954-1955, 1955-1956, 1956-1957, 1957-1958, 1958-1959, 1959-1960, 1960-1961, 1961-1962, 1962-1963, 1963-1964, 1964-1965, 1965-1966, 1966-1967, 1967-1968, 1968-1969, 1969-1970, 1970-1971, 1971-1972, 1972-1973, 1973-1974, 1974-1975, 1975-1976, 1976-1977, 1977-1978, 1978-1979, 1979-1980, 1980-1981, 1981-1982, 1982-1983, 1983-1984, 1984-1985, 1985-1986, 1986-1987, 1987-1988, 1988-1989, 1989-1990, 1990-1991, 1991-1992, 1992-1993, 1993-1994, 1994-1995, 1995-1996, 1996-1997, 1997-1998, 1998-1999, 1999-2000, 2000-2001, 2001-2002, 2002-2003, 2003-2004, 2004-2005, 2005-2006, 2006-2007, 2007-2008, 2008-2009, 2009-2010, 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017, 2017-2018, 2018-2019, 2019-2020, 2020-2021, 2021-2022, 2022-2023, 2023-2024, 2024-2025, 2025-2026, 2026-2027, 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THOMAS NAVY HYDROAIRPLANE, TYPE 264.

THIS machine has been designed particularly for training purposes, for either land or water use. Good inherent stability is secured by careful balance and moderate dihedral wing setting. Control surfaces are of generous dimensions to insure ease of handling under all conditions.

Speed range 40 to 65 M. P. H. with 100 H. P. engine

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BURGESS PRIMARY TRAINING TRACTOR, TYPE B. P.

This machine was designed by W. Stirling Burgess as the request of the United States Army for a primary training tractor to be used in the field during flight, thereby facilitating instruction.

This has been accomplished without sacrificing in the least the efficiency or appearance of the machine.

It fits the target and is used in the aviation schools—giving great range of control and allowing the instructor to be at the side of the pupil during flight, thereby facilitating instruction.

This has been given very satisfactory in experimental flights as well as in the official trials through which the machine passed with great success.

THE BURGESS COMPANY, Marblehead, Mass.
MANUFACTURERS OF THE MINOR-CURTIS AND BURGESS AIRPLANES
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